

Application No. 10/753,269

Reply to Office Action

*REMARKS/ARGUMENTS**The Pending Claims*

Claims 1-6 and 8-28 are pending. The pending claims are directed to a method of modifying a substrate.

Discussion of Amendments to the Specification

Paragraph [0037] of the specification has been amended to correct a grammatical error. No new matter has been added by way of this amendment.

Discussion of the Claim Amendments

Claim 1 has been amended to more particularly point out and distinctly claim the subject matter that Applicants regard as their invention. In particular, the feature recited in claim 7 has been incorporated into claim 1. Consequently, claim 7 has been cancelled without prejudice, and the dependency of claim 8 has been corrected to reflect this change. No new matter has been added by way of these amendments.

Summary of the Office Action

The Office Action rejects claims 1-3, 5-7, 22-23, and 27-28 under 35 U.S.C. § 102(a) as unpatentable over U.S. Patent Application Publication 2003/0075808 (Inoue et al.) (hereinafter, "Inoue"). The Office Action also rejects claims 1-3 and 5-7 under 35 U.S.C. § 102(a) as unpatentable over Japanese Patent Application 11-231925 (corresponding to Japanese Patent Application Publication 2001-057367 A) (Naoaki) (hereinafter, "Naoaki"). In addition, the Office Action rejects claims 4, 8-21, and 24-26 under 35 U.S.C. § 103(a) as unpatentable over Inoue in view of PCT WO 02/23613 A2 (Thomas et al) (hereinafter, "Thomas").

*Discussion of the Rejections**A. Claims 1-3, 5-7, 22-23, and 27-28*

Claims 1-3, 5-7, 22, 23, 27, and 28 are rejected as anticipated by Inoue. Claim 7 has been cancelled. The present invention as defined by amended claims 1-3, 5, 6, 22, 23, 27, and 28 is not anticipated by Inoue for the following reasons.

Inoue does not disclose polishing the substrate until dishing occurs with respect to the first metal. The Office Action states that Inoue discloses dishing in Figure 57C. However,

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Figure 57C does not disclose dishing, as is evident upon a closer inspection of Figure 57C and consideration of the related discussion in the specification (see paragraph 0276). If dishing was disclosed in Figure 57C, then the height of copper film 7 would be lower than the height of insulating layer 2. Instead, as shown in Figure 57C, the height of copper film 7 is equal to the height of, i.e., planar with, surrounding insulating layer 2. Moreover, the specification of Inoue states that "the copper film 7 and the barrier layer 5 on the insulating film 2 as removed by chemical mechanical polishing (CMP) so as to make the surface of the copper film 7 filled in the contact holes 3 and the trenches 4 for interconnects and the surface of the insulating film 2 lie substantially on the same plane" (paragraph 0276 (emphasis added)). Therefore, Inoue does not teach the polishing of the substrate until dishing occurs with respect to the first metal.

In view of the foregoing, the invention defined by claims 1-3, 5, 6, 22, 23, 27, and 28 is not anticipated by Inoue, and the anticipation rejection based on Inoue should be withdrawn.

B. Claims 1-3 and 5-7

Claims 1-3 and 5-7 are rejected as anticipated by Naoaki. Claim 7 has been cancelled. The Naoaki reference does not teach the deposition of a second metal onto the substrate at a rate of about 400 Å per minute or more as recited in claims 1-3, 5, and 6. Since the Naoaki reference does not teach each and every element of claims 1-3, 5, and 6, the invention defined by claims 1-3, 5, and 6 is not anticipated by Naoaki, and the anticipation rejection based on Naoaki should be withdrawn.

C. Claims 4, 8-21, and 24-26

Claims 4, 8-21, and 24-26 are rejected as unpatentable over Inoue in view of Thomas.

These claims, with the exception of claims 8 and 9, require the use of first and second CMP compositions. The Office Action concedes that Inoue does not disclose first and second CMP compositions, but rather relies on Thomas as allegedly disclosing the use of first and second CMP compositions (Office Action, page 4, ¶ 6). However, Thomas discloses only a single CMP composition followed by the introduction of a metal deposition solution (as opposed to a second CMP composition). Therefore, neither Inoue nor Thomas discloses the use of first and second CMP compositions. Since the references fail to teach and every element of claims 4, 10-21, and 24-26, these references, even in combination, cannot render

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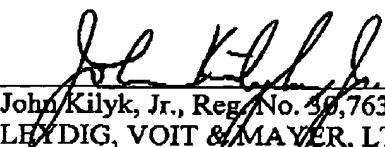
claims 4, 10-21, and 24-26 unpatentable. On this basis alone, the obviousness rejection as to claim 4, 10-21, and 24-26 should be withdrawn.

Moreover, there would have been no motivation for one of ordinary skill in the art at the relevant time of the present invention to combine the disclosure of Inoue with the disclosure of Thomas. Inoue discloses the use of electroless deposition to form a protective film over the surface of interconnects. The protective film of Inoue is directed to preventing the oxidation and contamination of the interconnects (Inoue, ¶ 0007). Nowhere does Inoue disclose the use of electroless deposition for dished metal redevelopment caused by a first chemical-mechanical polishing. In contrast to Inoue, Thomas is directed to dished metal redevelopment. A person having ordinary skill in the art would not have been motivated to combine the disclosure of a reference directed to protective films (i.e., Inoue) with the disclosure of a reference directed to dished metal redevelopment (i.e., Thomas) without improper hindsight of the present invention. Accordingly, the obviousness rejection based on the combination of Inoue and Thomas is improper and should be withdrawn as to claims 8 and 9, as well as claims 4, 10-21, and 24-26.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,


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